TITLE OF THE INVENTION

IMPROVEMENT TO A HELMET HAVING RESILIENT BENDING MEANS IN THE LOWER REAR PORTION OF THE SHELL THEREOF

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The present invention is related to an improvement to a helmet, and more specifically a helmet whose outer shell includes resilient bending means in its lower rear portion. The helmet is more especially adapted to be worn by aircraft and helicopter pilots, but non exclusively, since the invention can be used for any type of helmet.

Protective helmets are already known which are used in various fields and are worn by diverse users, such as cyclists, motorcyclists, firemen, skiers and others, such as aircraft and helicopter pilots. All of the current helmets, irrespective of their use, include a generally sphere-shaped rigid outer shell including a facial opening, and whose cavity thus formed includes protective and comfort padding elements adapted to nest the user's head.

For each type of utilization, manufacturers have attempted to design helmets having a specific configuration. But although many improvements have thus been envisioned, developed and implemented, all has not been accomplished. Indeed, the general comfort of the current helmets is fairly satisfactory as a whole, but it must be noted that the comfort of the helmet at the level of the user's nape leaves a lot to be desired, in spite of the presence in most current helmets of padding made of flexible material, or of a strap arranged within the rear portion of the shell, fairly complex and costly adjusting means then being provided so that the padding or the strap can be adapted to the size and shape of the user's nape.

The object of the present invention is to eliminate the drawbacks of the current devices and systems for the holding and comfort of the nape and proposes a new helmet in which the rear portion of the shell includes particularly simple resilient adaptation means. The adaptation to the user's nape occurs automatically, thereby providing it with a comfort which had not been achieved to date.

Thus, the protective helmet according to the invention is of the type including a main outer shell constituted by a wall having a front facial opening, and is characterized in that the lower rear portion of the wall includes resilient bending means, the main outer shell

being made of a deformable material.

According to complementary characteristics, the wall of the outer shell is made of plastic, or of a composite material of the type constituted, for example, by at least one layer of glass fibers and/or carbon fibers and/or aramid fibers or the like, impregnated with a thermoplastic or thermohardening resin.

The main outer shell of the helmet of the invention includes a plurality of wall portions, namely, an upper front wall portion extended rearwardly by an upper rear wall portion, which is itself extended downwardly by a lower rear wall portion limited downwardly by a lower edge, said lower rear wall portion including at least one notch opening which advantageously opens downwardly on the lower edge.

According to various embodiments, the lower rear wall portion includes two, three, four, or more slit-shaped lateral cutouts.

In a preferred arrangement, the protective helmet includes a nape cushion that is partially retained in the shell by the cutouts of the wall.

Other characteristics and advantages of the invention will become apparent from the description that follows, with reference to the annexed drawings which are only provided by way of non-limiting examples.

Figure 1 is an external lateral view of a helmet according to the invention;

Figure 2 is a front perspective view of the helmet;

Figure 3 is a rear view more particularly showing the invention;

Figure 4 is a partial cross-sectional view along IV-IV of Figure 3, but on a larger scale, showing how the fastening of the nape cushion is carried out;

Figure 5 is a partial cross-sectional view along V-V of Fig. 3, illustrating how the finish of the lower edge of the helmet is obtained;

Figures 6 and 7 show the shell alone, in a front view (Figure 6) and in a rear view (Figure 7);

Figure 8 is a perspective rear view, whereas Figure 9 shows the nape cushion with its fastening means in the same conditions;

Figures 10-18 are rear views similar to Figure 7 schematically showing, on another scale, nine possible alternative embodiments provided by way of examples.

Figures 19a, 19b, are views similar to Figures 8 and 9 illustrating an alternative embodiment.

Figures 20 and 21 are partial schematic views showing how the nape cushion could also be held.

Let's note that to simplify the drawings, the chin strap of the helmet provided by way of example, which is in fact well known in itself and can be of any type, has voluntarily not been shown.

The protective helmet shown by way of example in Figures 1-9, generally designated by the reference (1) is especially a helmet for an aircraft pilot, which has a longitudinal general plane of symmetry (P) which includes, in a known manner, a main outer shell (2) having a front facial opening (3) with an internal padding commonly referred to as the upper part (4).

The main outer shell (2) is constituted by a substantially spherical wall (5) with a generally vertical plane of symmetry (P) that is advantageously made of a composite material including a stacking of layers of reinforcing fibers impregnated and connected to one another by a resin matrix. The fibers can be glass, aramid, Nylon, polyethylene or

carbon fibers, while the matrix can be a thermohardenable or thermoplastic type of resin.

The main outer shell (2) includes a plurality of wall portions, namely, an upper front wall portion (6) extended rearwardly by an upper rear wall portion (7), which is itself extended downwardly by a lower rear wall portion (8), and further includes two lateral wall portions (9a, 9b). The upper front wall portion (6) corresponds to the zone occupied by the forehead of the user and is limited by the upper edge (10) of the facial opening (3) which, in turn, is limited laterally by two lateral edges (11a, 11b). The upper rear wall portion (7) corresponds to the zone occupied by the skull of the user, whereas the lower rear wall portion (8) corresponds to the zone occupied by the nape of the user. In addition, the wall (5) of the upper part is limited downwardly by a lower edge (12) extending in a general plane (Q) inclined with respect to the horizontal plane(H)to extend toward the rear (AR) and toward the top (HA). The lateral wall portions (9a, 9b) correspond to the zones occupied by the ears of the user and are limited forwardly by the corresponding lateral edge (11a, 11b) of the facial opening (3) and downwardly by the front ends of the lower edge (12).

According to the invention, the lower rear wall portion (8) of the outer shell limited downwardly by the lower edge (12) includes resilient bending means which enable an accurate adjustment and a wearing comfort for the helmet in the zone of the user's nape.

In the embodiment illustrated in Figures 1-9, and provided by way of example, the lower rear portion of the shell thus includes openings or cutouts (13, 14a, 14b) which advantageously open toward the bottom (BA) on the lower edge (12). According to the embodiment illustrated in Figures 1-9, three openings or cutouts (13, 14a, 14b) are provided which have the form of open slits on the lower edge to create two deformable tongues (15a, 15b) and two deformable lateral wall pieces (16a, 16b). The lower edge (12) therefore includes thee longitudinal notches (13, 14a, 14b), one central cutout (13) and two lateral cutouts (14a, 14b), providing flexibility to the wall of the helmet in the area where the openings are located, i.e., at the rear lower wall (8). Let's note that the axes of general symmetry (X1-X'1, X2-X'2, X3-X'3) of the three slits (13, 14a, 14b) extend toward the top (HA) and advantageously perpendicularly to the lower edge (12) along a length (L).

According to a particular arrangement, the helmet includes a peripheral nape cushion (17) arranged within the shell at the level of the lower edge (12). This nape cushion (17) is constituted by a foam padding (18) wrapped in a fabric covering (19). According to a preferred construction, the nape cushion (17) is held in the shell, at least partially, by the bending notches (13, 14a, 14b). To this end, projections (20, 20a, 20b) affixed to the nape cushion (17) are provided and are adapted to cooperate with the corresponding notches (13, 14a, 14b) to be held therein. Thus, the nape cushion (17) is, for example, extended upwardly by a flexible retaining wall (21) on which the three fastening projections (20, 20A, 20b) are fixed, each including a cylindrical portion (200) whose end includes a retaining flange (201), as can be seen more particularly in Figures 4 and 9.

Let's note also that the central portion (170) of the nape cushion (17) is advantageously extended laterally toward the front by lateral extensions (171, 172) that are fixed within the shell in order to be attached to the inner surface located at the level of the lower edge (12) and to the lateral edges (11a, 11b) of the facial opening. The fixing of the lateral extensions (171, 172) can be carried out by any means, such as gluing, fastening by self-gripping band, clipping or the like.

To provide the helmet with a better appearance and overall finish, a finishing portion(22) visible more particularly in Figures 1, 3, 4 and 5, is provided. Said finishing portion (22) is U-shaped and made of a flexible plastic material and is nested on the lower edge (12), while ensuring continuity with the edge of the three slits (13, 14a, 14b).

Furthermore, the inner lining of the shell (2) is constituted by an upper part (4), for example, made of a rigid foam covered with a layer of comfort flexible foam and of a fabric which ensures the internal decoration of the helmet. Let's note also the rear portion of the upper part is extended by a rear comfort band (26) made of a flexible foam and under which the retaining wall (21) of the nape cushion is engaged, as appears more particularly in Figure 4.

According to the embodiment shown by way of example, the cutouts (13, 14a, 14b) made in the wall (5) of the lower rear portion (8) of the shell (2) are three in number and

have the same length and the same width, but, of course, it could be otherwise and, for example, there could be only one slit (13) as is illustrated in Figure (10), or two cutouts (14a, 14b), as illustrated in Figure 11. Of course, there could be more than three cutouts, according to the embodiment of Figure 12 where four cutouts (14a, 14'a, 14b, 14'b)are provided.

Furthermore, in the preceding illustrations, the cutouts have the same length "L" and the same width "l", but it could be otherwise, as is schematically shown in Figures 13, 14, 15 and 16, which represent four other possible variations. In the two variations of Figures 13 and 14, the cutouts (13, 14a, 14b) have different lengths, whereas in the variations of Figure 15, it is their widths that are different.

Let's note also that the cutouts (13, 14a, 14b, 14'a, 14'b) that open on the lower edge (12) are longitudinal slits extending toward the top of the shell, but it could be otherwise, as is illustrated, for example, in Figures 17 and 18, which show two other possible embodiments.

It is understood that the helmet according to the invention can comprise one or more pivoting facial protective screens designated by the reference numeral (50), for example, as illustrated.

Figures 19a and 19b illustrate another alternative embodiment according to which the retention of the nape cushion (17) is constituted by projections (20, 20a, 20b) that are engaged in corresponding holes (200, 200a, 200b) made in the wall of the helmet.

Furthermore, let's note that the finishing portion could participate in the retention of the nape cushion (17) by actively retaining the fastening projections (20, 20a, 20b). Thus, as illustrated in Figure 20, one can provide retaining projections (220) on the finishing portion (22) that are adapted to hold the cylindrical portion (200) of the fastening projections (20, 20a, 20b) of the nape cushion (17). Figure 21 shows a variation according to which the finishing portion includes a peripheral projection (221) adapted to retain the flange (201) of the fastening projections (20, 20a, 20b) of the nape cushion.

Of course, the invention is not limited to the embodiments described and shown by way of examples, but it also includes all the technical equivalents as well as their combinations.

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